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EXAMINER	
MILIA, MARK R	

ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 11/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/054,652	PRITCHARD, THOMAS B.	
	Examiner	Art Unit	
	Mark R. Milia	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 September 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *29 and 30* is/are allowed.

6)☒ Claim(s) *1-28 and 31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment was received on 9/8/06 and has been entered and made of record. Currently, claims 1-31 are pending.

Response to Arguments

2. Applicant's arguments filed 9/8/06 have been fully considered but they are not persuasive. The applicant asserts that the reference of Metaxas (US 6307978) does not disclose "partitioning a group of pixels, corresponding to a group of values, into a plurality of columns including the pixels forming the group of pixels, with each of the columns including a plurality of rows of the pixels", as set forth in claims 1-8, 27-28, and 31. The examiner respectfully disagrees as Metaxas does disclose such a feature. Particularly, Metaxas discloses a matrix of image data containing n rows and m columns (see column 3 lines 57-60). The distribution of error values occurs between neighboring pixels in columns ahead of and behind each pixel being processed (see column 4 lines 30-41). Further, Fig. 3 shows that image data is partitioned into groups of columns with each group including a plurality of rows. Metaxas discloses that the processing of the pixels occurs in a diagonal fashion due to the plurality of processors employed. Also, Metaxas states that each pixel is processed only after all of the pixels from which it

depends have been processed (see column 4 lines 18-20). Although the processing of the pixels occurs with a plurality of pixels in a diagonal fashion, the invention of Metaxas serves the same purpose and function as that of the instant invention and does so in such a way to incorporate the use of columns and rows of pixels. Therefore, Metaxas discloses partitioning a group of pixels, corresponding to a group of values, into a plurality of columns including the pixels forming the group of pixels, with each of the columns including a plurality of rows of the pixels. The applicant also asserts that the reference of Metaxas does not disclose "a first processing device to perform halftoning on a first set of values corresponding to a first set of pixels forming a first column" and "a second processing device to perform halftoning on a second set of values corresponding to a second set of pixels forming a second column", as set forth in claims 9-26. The examiner respectfully disagrees as Metaxas does disclose such a feature. Particularly, Metaxas discloses a plurality of processors $\mathbf{P_1}$-$\mathbf{P_6}$ that perform halftoning on pixels that are contained in a plurality of columns. Metaxas shows in figures 3 and 4 that processor $\mathbf{P_1}$ performs halftoning a first set of values labeled **12**, **19**, and **20**, which are part of one column and processor $\mathbf{P_3}$ performs halftoning of a second set of values starting with the pixel labeled **29**. Therefore, it can be seen that processor $\mathbf{P_1}$ performs halftoning on a first set of values corresponding to a first set of pixels forming a first column and processor $\mathbf{P_3}$ performs halftoning on a second set of values corresponding to a second set of pixels forming a second column.

3. Therefore, the rejection of claims 1-28 and 31, as cited in the previous Office Action, is maintained and repeated in this Office Action.

Claim Rejections - 35 USC § 102

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-26 and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6307978 to Metaxas.

Regarding claim 1, Metaxas discloses a method, comprising: partitioning a group of pixels, corresponding to a group of values, into a plurality of columns including the pixels forming the group of pixels, with each of the columns including a plurality of rows of the pixels (see Figs. 3 and 4, column 3 lines 36-38, and column 4 lines 2-24), halftoning a first plurality of values, corresponding to a first one of the plurality of rows in a first one of the plurality of columns, to form a first plurality of error terms (see Figs. 3 and 4 and column 4 lines 7-24), and halftoning, using at least one of the first plurality of error terms, on a second plurality of values corresponding to a second one of the plurality of rows in a second one of the plurality of columns, after completion of the halftoning on the first plurality of values, to form a second plurality of error terms (see Figs. 3 and 4 and column 4 lines 2-24 and 30-47).

Regarding claim 9, Metaxas discloses an apparatus, comprising: a first processing device to perform halftoning on a first set of values corresponding to a first set of pixels forming a first column (see Fig. 3 and column 4 lines 2-6), a second processing device to perform halftoning on a second set of values corresponding to a

second set of pixels forming a second column, with ones of the first set of pixels located adjacent to the second set of pixels and with ones of the second set of pixels located adjacent to the first set of pixels (see Fig. 3 and column 4 lines 2-6), and a bus arranged for transferring a third set of values, from the halftoning of ones of the first set of values corresponding to the ones of the first set of pixels, to the second processing device and for transferring a fourth set of values, from the halftoning of ones of second set of values corresponding to the ones of the second set of pixels, to the first processing device (see column 4 lines 2-24 and column 6 lines 61-65).

Regarding claim 31, Metaxas discloses a halftoning apparatus, comprising: first means for halftoning on a first set of values corresponding to a first set of pixels partitioned from a group of pixels forming an image to form a first column (see Fig. 3 and column 4 lines 2-6), second means for halftoning on a second set of values corresponding to a second set of pixels partitioned from the group of pixels forming an image to form a second column, with ones of the first set of pixels located adjacent to the second set of pixels and with ones of the second set of pixels located adjacent to the first set of pixels (see Fig. 3 and column 4 lines 2-6), and means for transferring arranged to transfer a third set of values, from the halftoning of ones of the first set of values corresponding to the ones of the first set of pixels, to the second means for halftoning and for transferring a fourth set of values, from the halftoning of ones of second set of values corresponding to the ones of the second set of pixels, to the first means for halftoning (see column 4 lines 2-24 and column 6 lines 61-65).

Regarding claim 2, Metaxas further discloses wherein the first one of the plurality of columns and the second one of the plurality of columns include equal numbers of the pixels (see Fig. 4).

Regarding claim 3, Metaxas further discloses wherein the first one of the plurality of columns exists adjacent to the second one of the plurality of columns within an image formed by the plurality of columns (see Figs. 3 and 4) and a boundary at an interface between the first one of the plurality of columns and the second one of the plurality of segments forms a substantially straight line within the image (see Figs. 3 and 4, a substantially straight line exists between the plurality of segments in a diagonal orientation).

Regarding claim 4, Metaxas further discloses wherein the boundary exists substantially perpendicular to the plurality of rows of the pixels (see Figs. 3 and 4).

Regarding claim 5, Metaxas further discloses wherein the first one of the plurality of rows and the second one of the plurality of rows exist in alignment within the image (see Fig. 3 and column 2 lines 23-32).

Regarding claims 6, 10, and 18, Metaxas further discloses wherein the halftoning includes error diffusion halftoning (see Fig. 3, column 3 lines 36-47, and column 4 lines 2-24).

Regarding claim 7, Metaxas further discloses wherein halftoning of ones of the plurality of rows in the first one of the plurality of columns, other than the first one of the plurality of rows, occurs contemporaneously with halftoning of ones of the plurality of

rows in the second one of the plurality of columns, other than the second one of the plurality of rows (see Figs. 3 and 4 and column 4 lines 2-24)

Regarding claim 8, Metaxas further discloses the first one of the plurality of columns includes ones of the pixels included in the second ones of the plurality of columns (see Figs. 3 and 4).

Regarding claim 11, Metaxas further discloses wherein the third set of values includes error terms generated from the error diffusion halftoning of the ones of the first set of pixels (see Figs. 3 and 4 and column 4 lines 2-24), and the fourth set of values includes error terms generated from the error diffusion halftoning of the ones of the second set of pixels (see Figs. 3 and 4 and column 4 lines 2-24).

Regarding claim 12, Metaxas further discloses wherein the first set of pixels and the second set of pixels each include equal numbers of the pixels, with the first set of pixels and the second set of pixels included within an image (see Figs. 3 and 4, column 2 lines 23-32, and column 4 lines 2-24), and with the ones of the first set of pixels adjacent to the ones of the second set of pixels within the image (see Figs. 3 and 4 and column 4 lines 2-24).

Regarding claim 13, Metaxas further discloses wherein a boundary at an interface between the ones of the first set of pixels and the ones of the second set of pixels forms a substantially straight line within the image (see Figs. 3 and 4, a substantially straight line exists between the plurality of segments in a diagonal orientation).

Regarding claim 14, Metaxas further discloses wherein the first set of pixels includes a spatial arrangement into a first plurality of rows forming a first segment of the image (see Figs. 3 and 4 and column 4 lines 2-24) and the second set of pixels includes a spatial arrangement into a second plurality of rows forming a second segment of the image, with the ones of the first set of pixels forming the first column adjacent to the second column formed from the ones of the second set of pixels, with the boundary at the interface between the first column and the second column (see Figs. 3 and 4 and column 4 lines 2-24).

Regarding claim 15, Metaxas discloses wherein the first plurality of rows includes a first row located on a first edge of the first column and the second plurality of rows includes a second row located on a second edge of the second column, with the first row aligned with the second row in the image (see Figs. 3 and 4) and the first processing device includes a configuration to complete the error diffusion halftoning on the first row before the second processing device begins the error diffusion halftoning on the second row (see Figs. 3 and 4 and column 4 lines 2-24).

Regarding claim 16, Metaxas further discloses wherein the first plurality of rows includes a third row located adjacent to the first row in the first column (see Fig. 4), the second plurality of rows includes a fourth row located adjacent to the second row in the second column (see Fig. 4), the second processing device includes a configuration to begin the error diffusion halftoning on the second row before the first processing device completes the error diffusion halftoning on the third row (see Fig. 4), and the first processing device includes a configuration to complete the error diffusion halftoning on

the third row before the second processing device begins the error diffusion halftoning on the fourth row (see Fig. 4).

Regarding claim 17, Metaxas further discloses wherein the first processing device includes a first halftone processor and the second processing device includes a second halftone processor (see Fig. 3, column 3 lines 36-38, and column 4 lines 2-6).

Regarding claim 19, Metaxas further discloses a third processing device to perform halftoning on a fifth set of values corresponding to a third set of pixels (see Figs. 3 and 4), and a fourth processing device to perform halftoning on a sixth set of values corresponding to a fourth set of pixels, with ones of the third set of pixels located adjacent to the fourth set of pixels, with ones of the fourth set of pixels located adjacent to the third set of pixels, and with the bus coupled to the third processing device and the fourth processing device for transferring a seventh set of values, from the halftoning of the ones of the third set of pixels to the fourth processing device, and for transferring an eighth set of values, from the halftoning of the ones of the fourth set of pixels, to the third processing device (see Figs. 3 and 4 and column 4 lines 2-24 and 30-47).

Regarding claim 20, Metaxas further discloses wherein the third set of values includes error terms generated from the error diffusion halftoning of the ones of the first set of pixels (see Figs. 3 and 4 and column 4 lines 2-24), the fourth set of values includes error terms generated from the error diffusion halftoning of the ones of the second set of pixels (see Figs. 3 and 4 and column 4 lines 2-24), the seventh set of values includes error terms generated from the error diffusion halftoning of the ones of the third set of pixels (see Figs. 3 and 4 and column 4 lines 2-24), and the eighth set of

values includes error terms generated from the error diffusion halftoning of the ones of the fourth set of pixels (see Figs. 3 and 4 and column 4 lines 2-24).

Regarding claim 21, Metaxas further discloses wherein the first set of pixels, the second set of pixels, the third set of pixels, and the fourth set of pixels each include equal numbers of pixels, with the first set of pixels, the second set of pixels, the third set of pixels, and the fourth set of pixels included within an image (see column 2 lines 23-32).

Regarding claim 22, Metaxas further discloses wherein a first boundary formed at a first interface between the ones of the first set of pixels and the ones of the second set of pixels forms a substantially straight line within the image (see Fig. 4) and a second boundary formed at a second interface between the ones of the third set of pixels and the ones of the fourth set of pixels forms the substantially straight line within the image (see Fig. 4).

Regarding claim 23, Metaxas further discloses wherein the first set of pixels includes a spatial arrangement into a first plurality of rows forming the first column (see Figs. 3 and 4 and column 4 lines 2-24), the second set of pixels includes a spatial arrangement into a second plurality of rows forming the second column, with the ones of the first set of pixels forming the first column adjacent to the second column formed from the ones of the second set of pixels, with the first boundary at the interface between the first column and the second column (see Figs. 3 and 4 and column 4 lines 2-24), the third set of pixels includes a spatial arrangement into a third plurality of rows forming a third column (see Figs. 3 and 4 and column 4 lines 2-24), and the fourth set of

pixels includes a spatial arrangement into a fourth plurality of rows forming a fourth column, with the ones of the third set of pixels forming the third column adjacent to the fourth column formed from the ones of the fourth set of pixels, with the second boundary at the interface between the third column and the fourth column (see Figs. 3 and 4 and column 4 lines 2-24).

Regarding claim 24, Metaxas further discloses wherein the first plurality of rows includes a first row located on a first edge of the first column, the second plurality of rows includes a second row located on a second edge of the second column, the third plurality of rows includes a third row located on a third edge of the third column, the fourth plurality of rows includes a fourth row located on a fourth edge of the fourth column, with the first row, the second row, the second row, the third row, and the fourth row aligned within the image (see Figs. 3 and 4, column 3 lines 45-47, and column 4 lines 2-24), the first processing device includes a configuration to complete the error diffusion halftoning on the first row before the processing device begins the error diffusion halftoning on the second row (see Figs. 3 and 4, column 3 lines 45-47, and column 4 lines 2-24), the processing device includes a configuration to complete the error diffusion halftoning on the second row before the processing device begins the error diffusion halftoning on the third row (see Figs. 3 and 4, column 3 lines 45-47, and column 4 lines 2-24), and the processing device includes a configuration to complete the error diffusion halftoning on the third row before the processing device begins the error diffusion halftoning on the fourth row (see Figs. 3 and 4, column 3 lines 45-47, and column 4 lines 2-24).

Regarding claim 25, Metaxas further discloses wherein the first set of pixels includes a third set of pixels and the second set of pixels includes the third set of pixels, with the ones of the first set of pixels located adjacent to the third set of pixels and the ones of the second set of pixels located adjacent to the third set of pixels (see Fig. 4).

Regarding claim 26, Metaxas further discloses wherein the processing device includes a configuration to transfer a fifth set of values, corresponding to a first subset of pixels of the third set of pixels included within the first set of pixels, to the second processing device using the bus (see Fig. 3 and column 4 lines 2-24), the processing device includes a configuration to transfer a sixth set of values, corresponding to a second subset of pixels of third set of pixels included within the second set of pixels, to the first processing device using the bus (see Fig. 3 and column 4 lines 2-24), the processing device includes a configuration to perform the error diffusion halftoning on the sixth set of values (see Fig. 3 and column 4 lines 2-24), and the processing device includes a configuration to perform the error diffusion halftoning on the fifth set of values (see Fig. 3 and column 4 lines 2-24).

Claim Rejections - 35 USC § 103

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6870642 to Ostromoukhov in view of Metaxas (US 6307978).

Regarding claim 27, Ostromoukhov discloses an imaging device, comprising: an interface arranged to receive data, corresponding to an image, from a computer (see Figs. 3-5 and column 4 lines 50-65), a processor configured to generate color values, corresponding to pixels forming the image, using the data received from the interface (see column 5 lines 55-60), a processing system arranged to receive the color values and including a processing device to perform halftoning on a first set of values, included in the color values, corresponding to a first set of pixels included in the pixels forming the image to form a first set of halftone values (see column 6 lines 56-67), a processing device to perform halftoning on a second set of values, included in the color values, corresponding to a second set of pixels included in the pixels forming the image to form a second set of halftone values (see column 6 lines 37-67), with ones of the first set of pixels located adjacent to the second set of pixels and with ones of the second set of pixels located adjacent to the first set of pixels (see column 6 lines 37-67), an image forming mechanism configured to form the image using the first set of halftone values and the second set of halftone values (see column 5 lines 4-12), and memory to store the color values, the first set of halftone values, and the second set of halftone values (see column 7 lines 1-3).

Ostromoukhov does not disclose expressly a first set of pixels forming a first column and a second set of pixels forming a second column and a first processing device and a second processing device and a bus coupling the first processing device and the second processing device for transferring a third set of values from the halftoning of the ones of the first set of pixels to the second processing device and for

transferring a fourth set of values from the halftoning of the ones of the second set of pixels to the first processing device.

Metaxas discloses a first set of pixels forming a first column and a second set of pixels forming a second column (see Fig. 3) and a first processing device and a second processing device (see column 4 lines 2-6) and a bus coupling the first processing device and the second processing device for transferring a third set of values from the halftoning of the ones of the first set of pixels to the second processing device and for transferring a fourth set of values from the halftoning of the ones of the second set of pixels to the first processing device (see column 4 lines 2-24 and column 6 lines 61-65).

Ostromoukhov & Metaxas are combinable because they are from the same field of endeavor, halftoning using error diffusion.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine multiple processors and transferring of values, as described by Metaxas, with the system of Ostromoukhov.

The suggestion/motivation for doing so would have been to provide a faster and less time consuming process for halftoning images (see column 1 lines 41-46 of Metaxas).

Therefore, it would have been obvious to combine Metaxas with Ostromoukhov to obtain the invention as specified in claim 27.

Regarding claim 28, Metaxas further discloses wherein the halftoning includes error diffusion halftoning (see Figs. 3 and 4, column 3 lines 36-38, and column 4 lines 2-

24), the third set of values includes error terms generated from the error diffusion halftoning of the ones of the first set of pixels (see Figs. 3 and 4, column 3 lines 36-38, and column 4 lines 2-24), the fourth set of values includes error terms generated from the error diffusion halftoning of the ones of the second set of pixels (see Figs. 3 and 4, column 3 lines 36-38, and column 4 lines 2-24), the first set of pixels and the second set of pixels each include equal numbers of the pixels, with the first set of pixels and the second set of pixels and with the ones of the first set of pixels adjacent to the ones of the second set of pixels within the image (see Figs. 3 and 4, column 3 lines 36-38, and column 4 lines 2-24), and a boundary at an interface between the ones of the first set of pixels and the ones of the second set of pixels forms a substantially straight line within the image (see Figs. 3 and 4, column 3 lines 36-38, and column 4 lines 2-24)

Allowable Subject Matter

7. Claims 29 and 30 are allowed.

8. The following is a statement of reasons for the indication of allowable subject matter:

The examiner believes that it would not have been obvious to one of ordinary skill in the art at the time the invention was made to combine the first through fourth halftone processors associated with first through fourth printheads and printhead drivers that transfer error terms obtained by performing error diffusion halftoning between the

first and second processor, the second and third processor, and the third and fourth processor, with the other limitations as set forth in the claims.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark R. Milia whose telephone number is (571) 272-7408. The examiner can normally be reached M-F 8:00am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Twyler M. Lamb can be reached at (571) 272-7406. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Mark R. Milia
Examiner
Art Unit 2625

MRM

TWYLER LAMB
SUPERVISORY PATENT EXAMINER